E. O. CARTWRIGHT.

PORTABLE PUMPING APPARATUS.

APPLICATION FILED OCT. 25, 1918.

1,345,531.

Patented July 6, 1920.

3 SHEETS—SHEET 1.

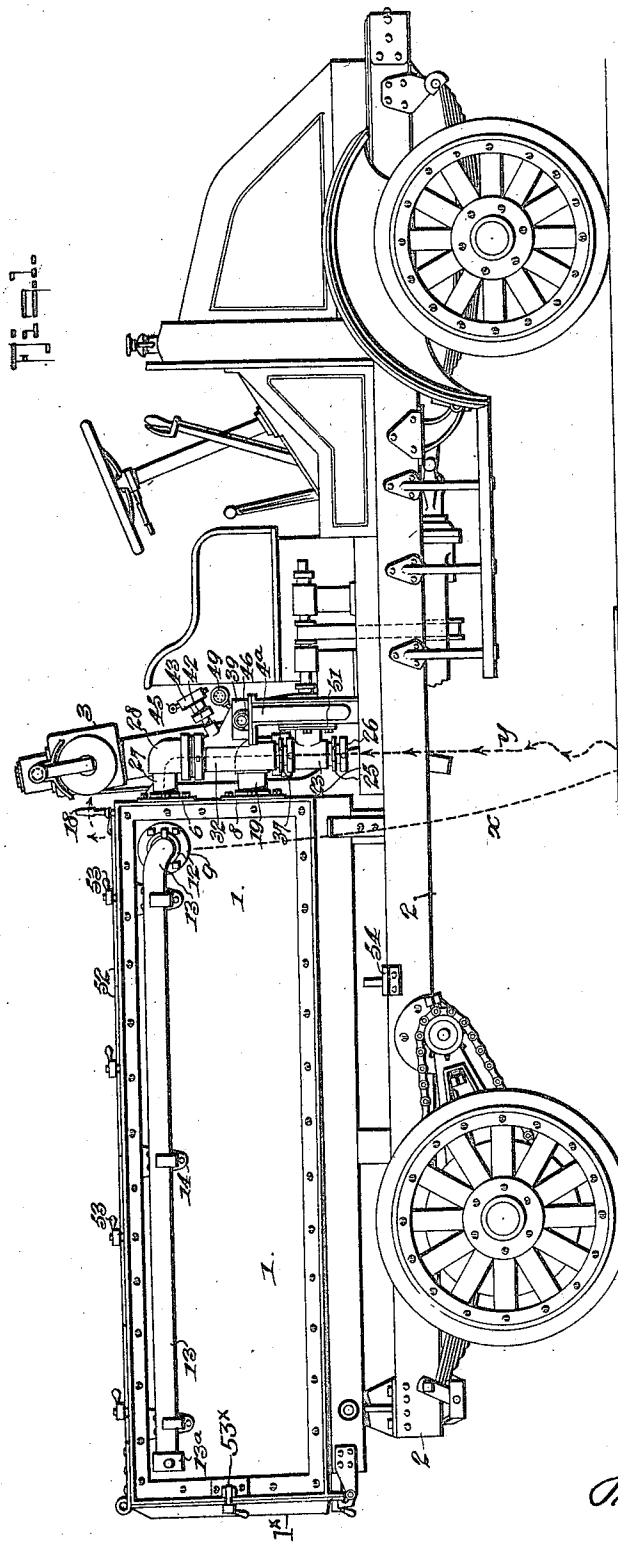


Fig. 1.

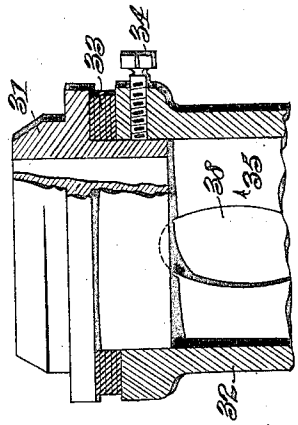


Fig. 5.

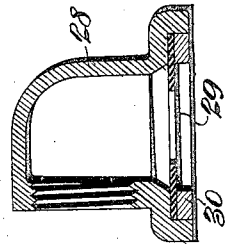


Fig. 3.

INVENTOR

Ernest O. Cartwright

BY

Fred G. Dieterich & Co.

ATTORNEYS

E. O. CARTWRIGHT.

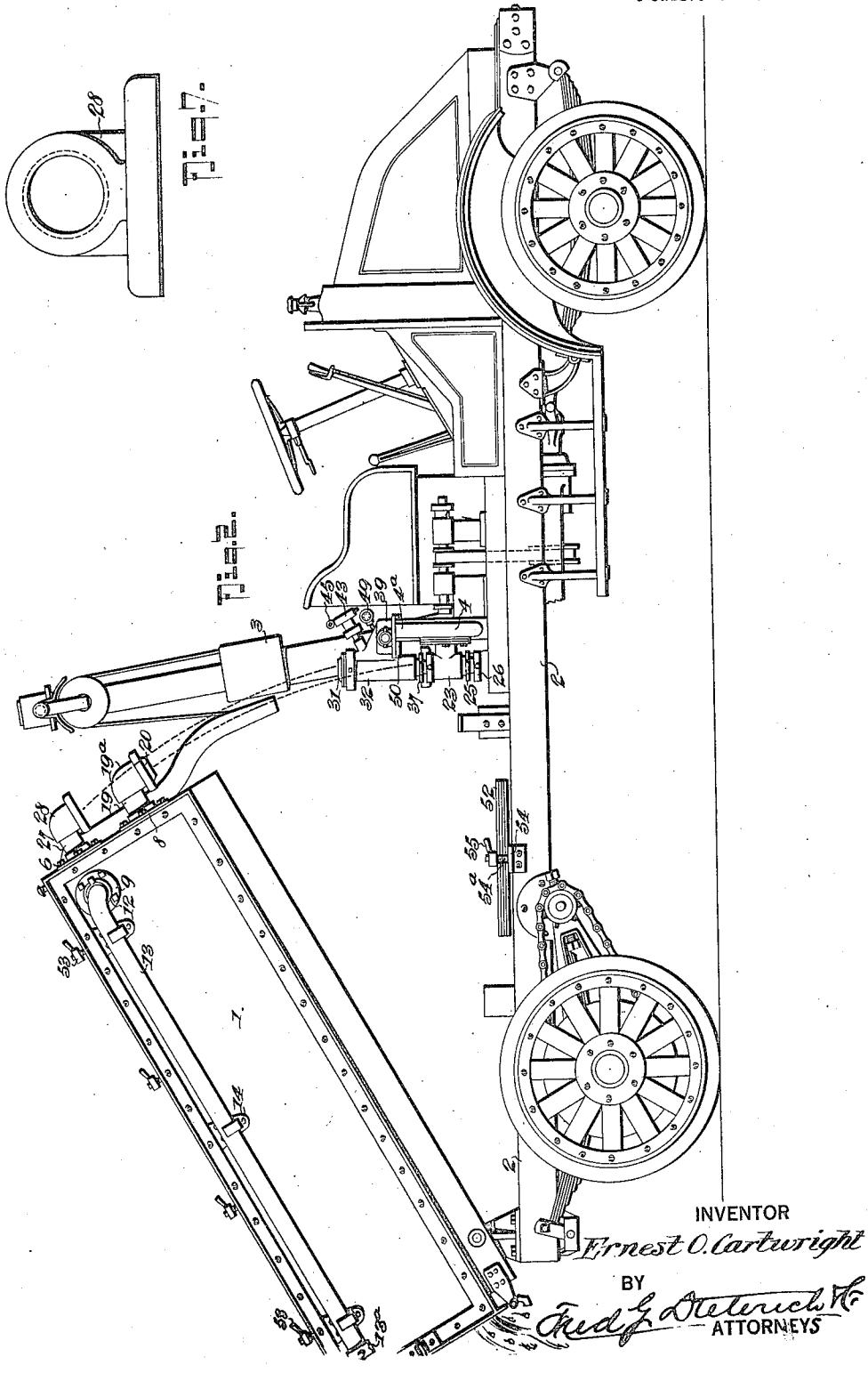
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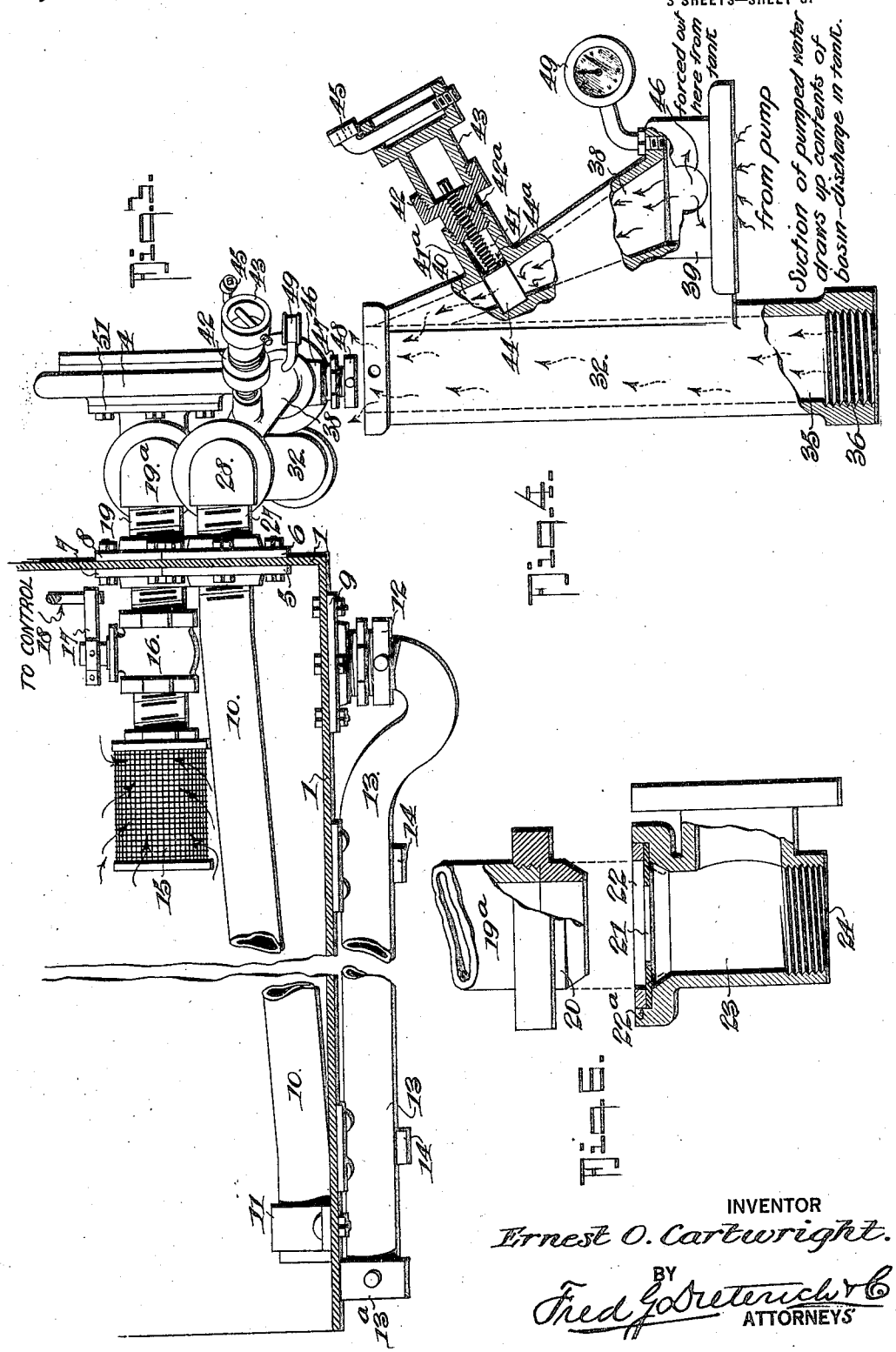
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ATTORNEYS

UNITED STATES PATENT OFFICE.

ERNEST ORSON CARTWRIGHT, OF SPRINGFIELD, OHIO, ASSIGNOR TO CHARLES F. GARDNER, OF SPRINGFIELD, OHIO.

PORTABLE PUMPING APPARATUS.

1,345,531. Specification of Letters Patent. Patented July 6, 1920.

Application filed October 25, 1918. Serial No. 259,668.

To all whom it may concern:

Be it known that I, ERNEST O. CARTWRIGHT, a citizen of the United States, residing at Springfield, in the county of Clark and State of Ohio, have invented a new and Improved Portable Pumping Apparatus, of which the following is a specification.

This invention relates to an apparatus adapted to be used for elevating and transporting liquids mixed with solids or sediment, the properties of which make it impracticable to handle them directly through the pump, which apparatus, in its complete makeup includes a motor driven vehicle, a liquid carrying tank mounted thereon and adapted to be dumped, a pump for taking liquid from the tank and returning it, under pressure, to the tank, means to operate the pump by power from the motor vehicle and an ejector through which the liquid taken by the pump from the tank must pass from the pump back into the tank.

Three prime objects of this invention are:

First. To provide an improved efficient portable pumping apparatus of the general character stated, in which the several elements that constitute the complete mechanism are so designed and coöperatively so combined whereby the construction of such type of portable pumping apparatus is of a simple and economical nature.

Second. To provide a new and novel construction of parts that are so located, relatively to each other, that the complete mechanism or apparatus is encompassed in a comparatively small limit of space upon the motor vehicle frame and the tank without the use of troublesome and unsightly overhanging and upwardly projected parts.

Third. To provide an improved means for suspending the circulation of the liquid through the pump, from and to the tank, in order that the pump may be utilized, at will, for either normal elevating or pressure purposes with the intake from an outside source other than the tank, or for direct pressure purpose with the intake from the tank.

With these and other objects in view all of which will hereinafter appear, my present invention embodies the features of construction and combination of parts to be fully explained in the following description, specifically pointed out in the appended claims and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of a motor vehicle with my improved pumping apparatus applied thereto, the pump, the ejector and the tank being shown in their relative positions, when operating.

Fig. 2 is a view similar to Fig. 1, the parts being shown in the relative operative position, when the tank is being dumped.

Fig. 3 is a horizontal section of a portion of the tank, and illustrates, in plan view, the discharge pipe to the rear of the tank, the pump intake at the front end of the tank, the overflow and the filter connection hereinafter specifically referred to.

Fig. 4 is a side elevation, partly in section, of the ejector and the stop or gate valve that coöperates therewith.

Fig. 5 is a detail view of the nipple connection for the upper end of the ejector.

Fig. 6 is a detail sectional elevation of the parts that constitute the detachable joint in the pump intake piping and the connection provided for the intake, when it is desired to use the pump for normal elevating purposes.

Figs. 7 and 8 are detail views hereinafter specifically referred to.

In carrying out my invention, I use a tank 1 of any suitable construction and which includes a tail gate 1^x that is pivotally mounted on the side members 2—2 of the motor vehicle frame, the gate being held closed by clamps 53^x.

3 designates a hoist, a hydraulic jack of well known construction, and 4 denotes a pump also of a well known construction, which pump is located on the motor vehicle frame between the front end of the tank and the back of the driver's seat.

As a specific construction of the tank, the motor vehicle, the pump and the hoisting jack, *per se*, constitute no part of my invention, further detail description thereof is deemed unnecessary.

5, 6, 7, 8 and 9 designate threaded flanges mounted around openings in two sides of the tank, at the front end thereof, and 10 designates a pipe that is threaded into the flange 5 and from which flange the said pipe extends rearwardly within the tank to a point in close proximity to the tail gate.

At the rear end, the pipe 10 is supported in an anchor bracket 11 secured to the inner

wall of the tank, as is clearly shown in Fig. 3 of the drawings.

12 designates a hose connection which threads into the flange 9 on the outside of the tank and the said connection 12 receives one end of a section of hose 13 that is normally supported upon brackets 14—14 along the outside of the tank on a line higher up on the tank than the flange 9.

At its free end, the hose 13 has a coupling 13ª adapted to be attached to a hydrant or other water supply (not shown).

A strainer 15 and a stop 16 are serially connected to the flange 7 and the said cock 16 is provided with a lever 17 that has a pull rod or control 18 which extends upwardly and outside of the tank for being conveniently manipulated by the driver while on the vehicle.

19 indicates a coupling pipe, one end of which threads into the flange 8 and whose other end threads into an elbow 19ª, the dependent or lower end of which is threaded to receive a flanged tapered nipple 20, as is best shown in Fig. 6, from which it will be noticed that in fitting the parts, the nipple 20 detachably seats against a gasket 21 that is held to its place by a retaining ring 22, in a recess 22ª in a specially designed flanged T coupling 23, which is coupled up with the intake of the pump, see Fig. 3.

The recess 22ª, in the coupling 23, merges with an annularly beveled seat against which the gasket 21 is bent back, when the nipple 20 is seated in the coupling, as indicated by dotted lines on Fig. 6.

The T coupling 23 has a threaded opening 24 in which is threaded a nipple 25 that is adapted to receive the coupling of a suction hose (not shown).

Normally the nipple 25 is held closed by a hose cap 26, as shown.

The flange 6 on the front end of the tank receives one end of a pipe 27 whose other end threads into a specially designed elbow 28 (see Fig. 8) and in a recess formed in the base of the said elbow, a gasket 29 is held in place by a retaining ring 30, as shown.

When the tank is at the normal or down position, shown in Fig. 1, the elbow 28 seats onto a tapered nipple 21 that is adjustably inserted into the upper end of the ejector 32, the details of which are best shown in Fig. 4.

In fitting the parts into operative connection, the nipple 31 is packed up to the necessary point of contact with the gasket 29 by means of packing rings 33 and it is held to its place by a set screw 34 that threads through the upper end of the ejector, see Fig. 5.

The ejector 32 contains two channels or passages 35 and 38, one of which 35 is a straight way passage that originates at the lower end of threaded opening 36 and terminates at its top end in the seat for the nipple 31.

37 designates a nipple that screws into the threaded opening 36 of the ejector and is adapted for receiving the coupling of a suction hose (not shown).

The channel or passage 38, before referred to, and which is of special shape constitutes a nozzleway and has its bottom end originating in a chamber 39 that is formed in the flanged portion which projects laterally from the ejector and the said passage 38 gradually tapers in upward direction and terminates in angular conjunction with the channel 35 through a constricted orifice 40.

An opening 41 in the laterally extended wall of the ejector intersects the constricted orifice 40 and connects with a threaded sleeve 42 that is normally held closed by a cap 43.

44 designates a stop or gate valve and the said valve is slidably adjustable in the neck 41ª having the opening 41.

The plug valve 44 includes a threaded stem 44ª which terminates in a head for receiving a suitable key 45 for which provision is made on the cap 43 for the convenient holding of the key ready for use, as shown in Fig. 4.

The threaded stem 44ª engages an internally threaded passage 42ª in the sleeve 42, it being apparent from Fig. 4 that by removing the cap 43 convenient access is had to the key receiving end of the stem 44ª for turning such stem to feed the plug 44 to the closed position, shown in the said Fig. 4, whereby to cut off the passage 38 that communicates, through the chamber 39, with the pump or for drawing it backward into the tubular neck 40ª, when a clearness is desired between the delivery from the pump and the constricted orifice 40 that joins with the ejector passage 35.

An outlet opening 46 connects the chamber 39 with a terminal 47 that is adapted to receive the coupling of a hose (not shown).

The terminal 47 is closed by a hose cap 48. A pressure gage 49 is optionally mounted on the chamber 39, as shown in Figs. 1, 2 and 3.

The laterally projected flanged portion of the ejector 32 bolts to a flange 50 on the delivery end 4ª of the pump 4, and the flanged portion of the T coupling 23 bolts to the intake face 51 of the said pump, as is clearly shown in Fig. 1.

52—52 designate sectional cover plates which are held down on top of the tank by winged bolt clamps 53—53, see Figs. 1 and 2, as hereinafter further explained.

Before proceeding with the detailed description of the operation of the apparatus

hereinbefore explained and as shown in the drawings, 3 functions of the said apparatus should be here stated, namely;

First. For the evacuation of cesspools, sumps, basins or depressions or excavations in which the character of the contents is such that they should not pass through the pump without partial separation from the solids contained in them;

Second. The pumping of liquids directly by means of the pump and delivering them either to the tank for hauling, or a distant point by piping;

Third. For purposes of spraying liquids from the tank or delivering the same, under pressure, at a distant point.

Referring now to the operation of the apparatus, the first function or method of its use is best explained as follows:

Hose 13 is removed from its holding brackets 14—14 and its free end connected to a source of water pressure, and through it the tank is supplied with sufficient water to cover the strainer 15. The hose 13 is then disconnected from the water supply and permitted to hang from its connection (see arrow x on Fig. 1) to act as an overflow channel for the tank.

The stop cock 16 is now opened by means of the pull control 18, acting through the lever 17 when the water within the tank passes through the piping 19 and the coupling 23, to the pump, which latter is thus primed for operation.

Upon application of power to the pump, water is forced through the constricted orifice 40 of the ejector 32, forming a jet which creates a partial vacuum in the straightway channel or passage 35, causes the water to pass up through the nipple 31, the elbow 28 and the pipe connection 27, into the delivery pipe 10 within the tank, from whence it is discharged at the rear end of the tank.

Now, if the nipple 37 be connected to any cesspool, sump, basin or other depression which collects sediment or accumulations that require periodically to be removed, the liquid and contaminations will be drawn up (see dotted lines and arrow y on Fig. 1) through the ejector passage 35 and the pipe 10, and deposited at the rear of the tank where the sediment and solids precipitate in an ever widening zone as more contaminations are deposited and the partly clarified liquid finds its way through the strainer 15 and stop cock 16 to the pump, whence it is returned in the circuit through the tapering ejector passage 38, again to the tank, continuing the jet which brings more contaminated liquid to be precipitated as before.

The overflow hose 13 conveys to any outside point of waste, the partially clarified liquid that collects within the tank beyond the level of the hose connection to the tank.

The operation just explained is continued until the tank is desirably loaded with precipitations, after which the pump is stopped, hose connection 13 restored upon the brackets 14, the stop cock 16 closed, the lift pipe from the cesspool is disconnected from the nipple 37, after which the apparatus is transported to a desired point for the dumping of its contents.

In order to facilitate the dumping operation and to minimize adjustment that might be required upon restoring the tank to its normal position, the detachable gasketed joints in the T coupling 23 and in the elbow 28, hereinbefore referred to, have been provided so that, when the front end of the tank is elevated for dumping, as indicated in Fig. 2, the joinings mentioned will separate at the gasket 21 in the T coupling 23 and at the nipple 31 on the elbow 28 and when the tank is restored (swung down) to the normal position, the two joints mentioned will automatically close.

In explaining the second function, as generally stated, operation of the parts is as follows:

Stop cock 16 and the hose cap 26 is removed and the place of the latter in the nipple 25 is taken by any suitable hose connected with any desired source of supply.

The cap 43 (see Fig. 4) is removed, the key 45 is used to return the plug valve 44 to the closed position for stopping off the jet orifice 40.

Cap 43 is then restored to its place on the plug 42.

Hose cap 48 is removed from the terminal 47 and its place is taken by any suitable hose connection wherewith, by starting the pump, the liquid pumped may be deposited either in the tank or at any other desired point.

By reversing the changes enumerated for this last stated function, it is obvious that the apparatus is restored for use according to the first stated operation.

For the third stated function, or use, the stop cock 16 is open and the hose cap is in its place closing nipple 25, the plug valve 44 being at either the open or closed position—open if it be desired to agitate the liquid in the tank, closed if only pressure at terminal 47 is desired—and through any suitable connection with the terminal 47, upon applying power to the pump, liquid in the tank may be disposed at any desired point.

In an apparatus of this character, it is desirable to provide the tank with a cover to avoid splashing of the contents, when in transit carrying liquids and also to avoid unsightly effects on both apparatus and surrounding surfaces, when the ejector is in operation.

It is also desirable to have the cover re-

movable in order that the tank may be loaded from the top for use, at will, for carrying masses other than liquids and to have the removed cover disposed upon the tank so as to be available at all times to be quickly restored to their functional location on the tank.

It is also a further desirability, that to facilitate transportation upon travelways, likely to be much used by an apparatus of the character stated, that the ejector and its necessary means of connection with the places to be evacuated, add to the machine the fewest number of projecting or overhanging parts beyond the normal limits of space necessary for the passage of the vehicle upon which the apparatus is mounted.

To satisfy the desirability for a cover for the tank, I have provided the plates 52, before referred to, and these are detachably placed crosswise of the top of the tank 1 and they are held to their position by the clamp members 53.

The plates 52 are slotted centerway of each end to clear studs of clamping screws 53 and to render said plates removable at will.

Crosswise of the motor vehicle frame is mounted a supporting bar 54 and the said bar is provided at each end with an upwardly extending stud 54^a onto which are received the slotted edges of the cover plates 52, when the latter are taken from the top of the tank, the said bar 54 constituting a convenient means for carrying the cover plates at all times on the apparatus.

Clamp devices 55 are provided for securely holding the plates in position when assembled on the cross bar 54, see Fig. 2.

To fulfil the desirability for compacting I have so designed the ejector 32 and correlated it with the other elements of the apparatus that the desired ends are attained.

While I have shown and described the special construction of cover plates, etc., yet I desire it understood that in this application I make no claim, *per se*, to the said cover plates, as such will form the subject matter of a divisional application.

From the foregoing taken in connection with the accompanying drawings, it is believed the complete construction, the manner of using the apparatus and the many advantages of the structural arrangement of the parts will be readily understood by those skilled in the art to which my invention relates.

What I claim is:

1. In apparatus of the class described, a truck, a tank mounted on said truck, means for raising and lowering an end of said tank to dump the contents, a pump on the vehicle adjacent to the end of the tank which is adapted to be raised and lowered, an ejector carried by said truck and relatively fixed as to position, said ejector having its ejecting-nozzle entrance in communication with the outlet of the pump and having its suction entrance adapted to be put into communication with the sump to be cleaned out, a discharge pipe for delivering the material from the ejector outlet into the tank, said pipe and said ejector having a separable-section joint adapted to effect a water tight connection, when the tank is down and to be automatically disconnected, when the tank is raised, a suction pipe carried by the tank and a separable-section coupling between said suction pipe and the inlet of said pump, which coupling is also adapted to effect a fluid tight joint, when the tank is down and to be automatically disconnected, when the tank is elevated.

2. In apparatus of the class described, a truck, a tank mounted on said truck, means for raising and lowering an end of said tank to dump the contents, a pump on the vehicle adjacent to the end of the tank which is adapted to be raised and lowered, an ejector mounted on said pump and relatively fixed as to position, said ejector having its ejecting-nozzle entrance in communication with the outlet of the pump and having its suction entrance adapted to be put into communication with the sump to be cleaned out, a discharge pipe for delivering the material from the ejector outlet into the tank, said pipe and said ejector having a separable-section joint adapted to effect a water tight connection, when the tank is down, and to be automatically disconnected, when the tank is raised, a suction pipe carried by the tank and a separable-section coupling between said suction pipe and the inlet of said pump, which coupling is also adapted to effect a fluid tight joint when the tank is down and to be automatically disconnected, when the tank is elevated.

3. In apparatus of the class described, the combination with a supporting vehicle, a force pump mounted thereon, an ejector having a duct through the same for the elevated material and having an ejection nozzle-way leading into said duct, a valve for controlling said nozzle-way, means for securing said ejector to said pump with the entrance to said nozzle-way in communication with the exit of said pump, a tank on said vehicle, means for elevating and lowering said tank to dump its contents, a delivery pipe for conveying material from the exit of said ejector duct into said tank and a suction pipe for conveying fluid from said tank to the intake of said pump, a separable-section coupling between said pump and said section pipe, a separable-suction coupling between said delivery pipe and said ejector, said pump and ejector being relatively stationary and said delivery and suction device being mounted on the tank and movable with the same to "make and break" said.

joint accordingly as to whether the tank is down or up.

4. In apparatus of the class described, the combination with a truck, a force pump mounted thereon, an ejector having a passageway through the same for the material operated on and having an ejection nozzle-way delivering into said passage and directed toward the outlet of the same, said ejector having a chambered portion at the entrance to said nozzle-way, a valve structure for closing off said nozzle-way, said ejector having an outlet from said chambered portion distinct from said nozzle-way, means for mounting said ejector on said pump with the exit of the pump in communication with said chambered portion, all being arranged whereby the pump may deliver through said nozzle-way or through said distinct outlet accordingly as the valve of said valve structure is open or closed and accordingly as said distinct outlet is open or closed, said distinct outlet being adapted to be closed, when not in use.

5. In apparatus of the class described, a truck, a pump relatively fixed thereon, an ejector mounted on the pump and having a passage for the material operated upon and a nozzle-way delivering into the passage and directed toward the exit end of the same, said nozzle-way being in communication with the outlet of said pump, a tank mounted on said truck to be tilted to dump, means for tilting said tank, a pipe mounted on the tank to deliver the material into the tank, a separable-section coupling between said pipe and the exit end of said ejector passage, another pipe on the tank for conveying water out of said tank, a separable-section coupling between said other pipe and the inlet of said pump and an overflow pipe carried by said tank, all being arranged so that, when the tank is down, the coupling sections will be in fluid tight engagement and will be automatically disconnected or separated as said tank is raised.

6. In apparatus of the class described, a truck, a pump relatively fixed thereon, an ejector mounted on the pump and having a passage for the material operated upon and a nozzle-way delivering into the passage and directed toward the exit end of the same, said nozzle-way being in communication with the outlet of said pump, a tank mounted on said truck to be tilted to dump, means for tilting said tank, a pipe mounted on the tank to deliver the material into the tank, a separable-section coupling between said pipe and the exit end of said ejector passage, another pipe on the tank for conveying water out of said tank, a separable-section coupling between said other pipe and the inlet of said pump and an overflow pipe carried by said tank, all being arranged so that, when the tank is down, the coupling sections will be in fluid tight engagement and will be automatically disconnected or separated as said tank is raised, said overflow pipe comprising a flexible pipe section carried on the outside of the tank and communicating with the interior of the tank, near the top of the same, and means for holding said flexible pipe in place on the tank in a position to drain back into the tank.

7. In apparatus of the class described, a power driven truck, a tank, means pivotally mounting said tank at the rear of the truck, means for raising and lowering the front end of the tank, a gate hinged at the top to close the rear end of the tank and open by gravity, means for holding said gate closed, cover plates secured over the top of the tank, said tank having a fluid outlet, near the top of the forward end of the same, a hose having one end connected over said outlet, brackets on the tank to carry said hose in a position to drain back into the tank and pumping instrumentalities on the truck and connected with the tank by automatically operating separable-section connections to deliver material into the tank and remove fluid from the tank, and means for driving said pump from the power mechanism of the truck.

8. In apparatus of the class described, a truck, a tiltable tank on the truck, a pump mounted on the truck, an ejector mounted on the pump and adapted to receive, at its suction end, a hose to be lowered into the sump, the tank having an inlet, an elbow connection including a separable-section coupling between the tank inlet and the outlet of the ejector, the nozzle-way of the ejector being in communication with the outlet of the pump, and a connection between the tank and the inlet of the pump which includes a separable joint elbow.

9. In apparatus of the class described, a truck, a tiltable tank on the truck, a pump mounted on the truck, an ejector mounted on the pump and adapted to receive, at its suction end, a hose to be lowered into the sump, the tank having an inlet, an elbow connection including a separable-section coupling between the tank inlet and the outlet of the ejector, the nozzle-way of the ejector being in communication with the outlet of the pump, and a connection between the tank and the inlet of the pump which includes a separable joint elbow, a strainer pipe in the tank and connected to said last named connection, said strainer pipe including a cut-off valve, said last named elbow including a passage adapted to be connected to an outside source of fluid supply and said ejector having a valve to close said nozzle-way and also having an outlet between said

nozzle-way valve and the pump, all being arranged substantially as shown and for the purpose described.

10. In a portable pumping apparatus of the character described, the combination with the vehicle body, a pump mounted thereon, a tiltable tank, elbow coupling members connected with the tank filler and evacuating piping, an ejector attached to the discharge thereof, "make and break" joints that automatically interengage as the tank is lowered to its filling position, whereby to close in the tank intake and outlets with the pump intake and outlet and to automatically become disconnected as the tank is raised for dumping, said ejector being mounted on and in direct communication with said pump.

11. In apparatus of the class described, a supporting vehicle, a tank, a pump and an ejector mounted as a unit on the vehicle, said ejector adapted to receive at its suction end a hose to be lowered into the sump, said tank having an inlet duct and an outlet duct, a separable section-coupling between the inlet duct of the tank and the outlet of the ejector, the nozzle-way of the ejector being in communication with the outlet of the pump, and a separable section-coupling between the outlet duct of the tank and the inlet of the pump.

12. In apparatus of the class described, a supporting vehicle, a tank, a pump and an ejector mounted as a unit on the vehicle, said ejector adapted to receive at its suction end a hose to be lowered into the sump, said tank having an inlet and an outlet, a separable-section-coupling between the inlet of the tank and the outlet of the ejector, the nozzleway of the ejector being in communication with the outlet of the pump, and a duct connecting the outlet of the tank to the inlet of the pump.

13. In apparatus of the class described, a supporting vehicle, a tank, a pump and an ejector mounted as a unit on the pump, said ejector adapted to receive at its suction end a hose to be lowered into the sump, said tank having an inlet duct entering the tank below the top, said tank having an outlet duct, a duct connection between the inlet duct of the tank and the outlet of the ejector, the nozzleway of the ejector being in communication with the outlet of the pump, and a duct connection between the outlet of the tank and the inlet of the pump, and means for controlling the action of the ejector.

14. In apparatus of the class described, the combination with a vehicle and a tiltable settling bed tank body thereon having an inlet and an outlet, and a pump on the vehicle, an ejector mounted on the pump, the nozzleway of the ejector being in communication with the discharge outlet of the pump, a duct connecting the inlet of the tank body with the outlet of the ejector, a duct connecting the outlet of the tank body with the intake of the pump, means for directing the material from the sump to the suction end of the ejector, and means for controlling the action of said ejector.

15. In apparatus of the class described, a truck, a tank mounted on the truck, means for raising and lowering one end of said tank to dump the contents, a pump on the truck, an ejector mounted directly on the pump constituting a unit therewith, said ejector having its ejecting nozzle entrance in communication with the outlet of the pump and having its suction entrance adapted to be put into communication with the sump to be cleaned out, a discharge duct for delivering the material from the ejector outlet into the tank when the tank is lowered, a suction duct between the tank and the inlet of the pump adapted to convey fluid from the tank to the pump when the tank is down.

16. In apparatus of the class described, a truck, a tank mounted on the truck, means for raising and lowering one end of said tank to dump the contents, a pump on the truck, an ejector mounted directly on the pump constituting a unit therewith, said ejector having its ejecting nozzle entrance in communication with the outlet of the pump and having its suction entrance adapted to be put into communication with the sump to be cleaned out, a discharge duct for delivering the material from the ejector outlet into the tank when the tank is lowered, a suction duct between the tank and the inlet of the pump adapted to convey fluid from the tank to the pump when the tank is down, and a control valve device for the ejector.

17. In an apparatus of the class described, a supporting vehicle, a tank, a pump and an ejector relatively fixedly mounted on the vehicle, said ejector adapted to receive at its suction end a hose to be lowered into the sump, said tank having an inlet and an outlet, a duct connecting the inlet of the tank with the outlet of the ejector, the nozzleway of the ejector being in communication with the outlet of the pump, and a duct connecting the outlet of the tank to the inlet of the pump.

ERNEST ORSON CARTWRIGHT.